

REMARKS

Applicants have amended claims 1, 3, 14-16, 18, and 29-30 and have canceled claims 2, 17, and 31 during prosecution of this patent application. Applicants are not conceding in this patent application that said amended and canceled claims are not patentable over the art cited by the Examiner, since the claim amendments and cancellations are only for facilitating expeditious prosecution of this patent application. Applicants respectfully reserve the right to pursue said amended and canceled claims, and other claims, in one or more continuations and/or divisional patent applications.

New claim 32 includes all of the limitations of claims 1, 5, 6, and 15 and additional features.

The Examiner rejected claims 1-3, 11, 12, 14, 16-18, 26, 27 and 29 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472).

The Examiner rejected claims 4 and 19 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 3 further in view of Brecher (US Pat. No. 5,544,256).

The Examiner rejected claims 5 and 20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of Bishop (US Pat. No. 4,589,140).

The Examiner rejected claims 6-10 and 21-25 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of Simard (US Pub. No. 2003/0202696).

The Examiner rejected claims 13 and 28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of Morrin (US Pat. No. 4,005,411).

The Examiner rejected claims 15 and 30 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of DeCamp (US Pat. No. 6,063,132).

Applicants respectfully traverse the § 103 rejections with the following arguments, and Applicants also discuss new claim 32.

35 U.S.C. § 103(a): Claims 1-3, 11, 12, 14, 16-18, 26, 27 and 29

The Examiner rejected claims 1-3, 11, 12, 14, 16-18, 26, 27 and 29 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472).

Since claims 2 and 17 have been canceled, the rejection of claims 2 and 17 under 35 U.S.C. § 103(a) is moot.

Applicants respectfully contend that claims 1 and 16 are not unpatentable over Fridge in view of Chung, because Fridge in view of Chung does not teach or suggest each and every feature of claims 1 and 16.

As a first example of why claims 1 and 16 are not unpatentable over Fridge in view of Chung, Fridge in view of Chung does not teach or suggest the feature: “wherein the second shape pattern consists of all of the first shape pattern and error shapes”.

The Examiner argues that Fridge discloses the first shape pattern being formed from the combination of the inner boundary template 62 and the outer template 64, as allegedly depicted in FIG. 3 of Fridge. The Examiner further argues that Fridge discloses the second shape pattern including all of the area of the inner template 62, part of the area of outer template 64, and error shapes 74 and 76, as allegedly depicted in FIG. 4 of Fridge.

In response, Applicants respectfully contend that all of the area of the inner template 62 is excluded by the aforementioned “consisting of” language in claims 1 and 16 from being with the claimed second shape pattern.

Therefore, claims 1 and 16 are not unpatentable over Fridge in view of Chung.

As a second example of why claims 1 and 16 are not unpatentable over Fridge in view of Chung, Fridge in view of Chung does not teach or suggest the feature: “deleting a subset of the environment shapes such that only a plurality of unique environment shapes satisfying a selection criterion remain subject to the remaining unique environment shapes differing from each other with respect to a geometrical characteristic of their respective geometric shapes”.

The Examiner argues that Chung teaches “deleting a subset of the environment shapes such that only unique environment shapes satisfying a selection criterion remain” with respect to the alleged selection criteria relating to the MIN value in FIG. 8 of Chung.

In response, Applicants respectfully contend that the environmental shapes in Chung are exposure spots having a width w , a height h , and an assigned dose. (See Chung, col. 5, lines 35-41. Therefore since the width w and height h are the only disclosed geometrical characteristics of the respective geometric shapes of the environmental shapes in Chung, in order for the remaining unique environment shapes satisfying the selection criterion to differ from each other with respect to a geometrical characteristic of their respective geometric shapes, all of the remaining unique environment shapes satisfying the selection criterion must have a different combination of the width w and height h , which Chung does not disclose.

Therefore, claims 1 and 16 are not unpatentable over Fridge in view of Chung.

In addition, Applicants respectfully contend that the Examiner’s argument for modifying Fridge by the alleged teaching of Chung is not persuasive.

The Examiner argues: “It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include deleting a subset of the environment shapes

because the number of data operated on during analysis for displacements is very much reduced and can be accomplished at very high speed (see col. 12 lines 11 — 17).”

In response, Applicants note that the reason that “the number of data operated on during analysis for displacements is very much reduced and can be accomplished at very high speed” in Chung is that Chung exploits repeated patterns and constancy in the four parameters (spot width w , spot height h , spot separation Δ , spot dosage level) of Chung’s analysis (e.g., see Chung, col. 1, lines 7-14; col. 6, lines 27-37). However, such repeated patterns and constancy in parameters are not disclosed in Fridge.

In addition, there is no disclosure in Fridge indicating that the step of “deleting a subset of the environment shapes such that only a plurality of unique environment shapes satisfying a selection criterion remain subject to the remaining unique environment shapes differing from each other with respect to a geometrical characteristic of their respective geometric shapes” is compatible with Fridge’s disclosed system and method, and with Fridge’s objectives as recited in Fridge, col. 2, lines 43-68.

For example, Fridge, col. 2, lines 43-45 recites: “The primary object of the present invention therefore is to provide a high speed reliable optical inspection system utilizing a template matching technique”. Applicants respectfully contend that the matching technique in Fridge cannot be implemented if error shapes are deleted. For example, see claim 1 of Fridge. The Examiner has not provided evidence allegedly showing that the Examiner’s proposed modification of Fridge enables use of Fridge’s template matching technique.

Based on the preceding arguments, Applicants respectfully maintain that claims 1 and 16

are not unpatentable over Fridge in view of Chung, and that claims 1 and 16 are in condition for allowance. Since claims 3, 11, 12 and 14 depend from claim 1, Applicants contend that claims 3, 11, 12 and 14 are likewise in condition for allowance. Since claims 18, 26, 27 and 29 depend from claim 16, Applicants contend that claims 18, 26, 27 and 29 are likewise in condition for allowance.

In addition with respect to claims 12 and 27, Fridge in view of Chung does not disclose the feature: “wherein the deleting step includes sorting the environment shapes in accordance with N sort keys such that the N sort keys are the N independent characteristics ..., wherein each environment shape is polygonal, wherein N is at least 2, and wherein the N independent characteristics comprise at least two of: the vertex count of the environment shape, the area of the environment shape, and a perimeter of the environmental shape”.

The Examiner argues that Chung discloses the preceding feature of claims 12 and 27.

In response, Applicants respectfully maintain that the preceding feature of claims 12 and 27 require sorting the environment shapes in accordance with at least two of the following sort keys: the vertex count of the environment shape, the area of the environment shape, and a perimeter of the environmental shape.

However, only one sort key is used in Chung, which is either the sort key of exposure dose or the sort key of spot separation Δ as indicated in Chung, col. 8, lines 14-18 (“the form of data compaction derived by preferentially sorting by exposure dose will usually but not always yield a greater degree of data compaction than preferentially sorting by Δ ”). Chung does not teach that two of the preceding parameters (vertex count, area, perimeter of the exposure spots)

are used as sort keys for sorting the environment shapes.

Therefore, claims 12 and 27 are not unpatentable over Fridge in view of Chung.

In addition with respect to claims 14 and 29, Fridge in view of Chung does not disclose the feature: “wherein the error shapes comprises a plurality of additive shapes and a plurality of subtractive shapes, and wherein each subtractive shape is a void created by having shifted a portion of the first shape pattern in a direction”.

The Examiner alleges that Chung, col. 11, lines 15-19 teaches the preceding feature of claims 14 and 29.

In response, Applicants assert that Chung, col. 11, lines 15-19 does not disclose subtractive error shapes as specifically claimed by Applicants.

Therefore, claims 14 and 29 are not unpatentable over Fridge in view of Chung.

35 U.S.C. § 103(a): Claims 4 and 19

The Examiner rejected claims 4 and 19 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 3 further in view of Brecher (US Pat. No. 5,544,256).

Since claim 4 depends from claim 1, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 4 is likewise not unpatentable over Fridge in view of Chung and further in view of Brecher under 35 U.S.C. §103(a).

Since claim 19 depends from claim 16, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 19 is likewise not unpatentable over Fridge in view of Chung and further in view of Brecher under 35 U.S.C. §103(a).

In addition with respect to claims 4 and 19 , Fridge in view of Chung does not disclose: “distributing the error shapes into at least one group such that the at least one group is defined by a grouping criterion, ... wherein the grouping criterion relates to a combination of an area of the error shape and a smallest linear dimension of the error shape”.

The Examiner argues: “With regards with claim 4, Fridge discloses all of the claim elements / features as discussed above in rejection for claim 3 and incorporated herein by reference, but fails to disclose grouping combination of error shapes. Brecher (US pat no 5,544,256) discloses grouping to a combination of an area of error shape and a smallest linear dimension of the error shape (see fig 7 and col. 10 lines 3 — 5 — the circle shape defect is the

smallest defect and is grouped with other shape errors).”

In response, Applicants cite Becher, col. 10, lines 3-8 which teaches grouping criteria of spatial proximity criteria and common feature criteria. In particular, Becher, col. 10, lines 3-8 teaches that the regions 16 in the defect clusters 12 and 14 in FIG. 7 of Becher are grouped based on spatial proximity criteria (“the distance between their bounding boxes is less than a predetermined number of pixels that can be set by the user”). Becher does not teach grouping criteria of an area of the error shape and a smallest linear dimension of the error shape.

Thus the Examiner has incorrectly interpreted what Becher teaches in FIG. 7 as to grouping criteria.

In addition, Applicants respectfully contend that the Examiner’s argument for modifying Fridge by the alleged teaching of Becher is not persuasive.

The Examiner argues: “It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include grouping to a combination of an area of error shape and a smallest linear dimension of the error shape because the smallest error shape are almost insignificant, so the grouping those smallest error shape with other shape groups save processing due to having to process less error shapes”.

In response, Applicants disagree with the Examiner’s that “grouping those smallest error shape with other shape groups save processing due to having to process less error shapes”. The grouping itself adds processing and the Examiner has not cited anything in Becher or in any other prior art allegedly indicating that the net processing would be reduced.

Moreover, the Examiner’s argument for modifying Fridge by the alleged teaching of

Becher is not supported by citation from the prior art. The Examiner's argument for modifying Fridge by the alleged teaching of Becher apparently did not originate from the prior art, but rather appears to have originated from the Examiner's creative imagination which is not a legally persuasive basis for combining references.

Therefore, claims 4 and 19 are not unpatentable over Fridge in view of Chung and further in view of Brecher.

35 U.S.C. § 103(a): Claims 5 and 20

The Examiner rejected claims 5 and 20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of Bishop (US Pat. No. 4,589,140).

Since claim 5 depends from claim 1, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 5 is likewise not unpatentable over Fridge in view of Chung and further in view of Bishop under 35 U.S.C. §103(a).

Since claim 20 depends from claim 16, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 20 is likewise not unpatentable over Fridge in view of Chung and further in view of Bishop under 35 U.S.C. §103(a).

In addition with respect to claim 5 and 20, Fridge in view of Chung does not disclose: “expanding each error shape in the subset to form a corresponding expanded shape; and forming the at least one environment shape corresponding to each expanded shape by removing all portions of the expanded shape which are common to the second shape pattern”.

The Examiner argues: “With regards to claim 5, Fridge discloses all of the claim elements / features as discussed above in rejection for claim 3 and incorporated herein by reference, but fails to disclose forming one environment from expanded error shape. Bishop (US pat no 4,589,140) discloses expanding each error shape in the subset to form a corresponding expanded shape (see fig 7b — the defect shape is magnified or expanded) and form the at least one

environment shape corresponding to each expanded shape by removing all portions of the expanded shape which are common to the second shape pattern (fig 7b is the environment shape; also the rest of the image, other than the defect area, in fig 7c are remove from to obtain the image in fig 7b).”

In response, Applicants respectfully contend that the Examiner has misinterpreted FIGS. 7a, 7b, and 7c of Bishop. FIG. 7b is not derived by removing anything from FIG. 7c as the Examiner alleges. Both FIG. 7b and 7c are independently derived from FIG. 7a. FIG. 7b is a high magnification view of pin hole A and its surrounding pad. FIG. 7c is a low magnification view of pin hole A and its surrounding pad. Moreover, both the pin hole A and the pad material is present in all of FIGS. 7a, 7b, and 7c. Therefore, the limitation of “removing **all portions** of the expanded shape which are common to the second shape pattern” is not disclosed in Bishop.

In addition, Applicants respectfully contend that the Examiner’s argument for modifying Fridge by the alleged teaching of Bishop is not persuasive.

The Examiner argues: “It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include expanding the area of the defect because to obtain the detail shape of the defect in order to classify the defect, so it can be use later to identify defect shapes similar to the one being identify currently.”

In response, Applicants note that there is no teaching in the prior art of a need to identify defect shapes similar to the one being identified currently. The Examiner’s argument for modifying Fridge by the alleged teaching of Bishop is not supported by citation from the prior art. The Examiner’s argument for modifying Fridge by the alleged teaching of Bishop apparently

did not originate from the prior art, but rather appears to have originated from the Examiner's creative imagination which is not a legally persuasive basis for combining references.

Therefore, claims 5 and 20 are not unpatentable over Fridge in view of Chung and further in view of Bishop.

35 U.S.C. § 103(a): Claims 6-10 and 21-25

The Examiner rejected claims 6-10 and 21-25 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of Simard (US Pub. No. 2003/0202696).

Since claims 6-10 depend from claim 1, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claims 6-10 are likewise not unpatentable over Fridge in view of Chung and further in view of Simard under 35 U.S.C. §103(a).

Since claims 21-25 depend from claim 16, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claims 21-25 are likewise not unpatentable over Fridge in view of Chung and further in view of Simard under 35 U.S.C. §103(a).

In addition with respect to claims 6 and 21, Applicants respectively contend that Fridge in view of Chung and further in view of Simard does not disclose the feature: “wherein the deriving step comprises: expanding each error shape in the subset to form a corresponding expanded shape; and forming the at least one environment shape corresponding to each expanded shape by removing all portions of the expanded shape which are common to the second shape pattern”.

The Examiner’s analysis of claim 5 acknowledges that Fridge in view of Chung does not disclose the preceding feature. The Examiner also relies on Simard, FIG. 3 and 4. Applicants assert, however, that Simard, FIG. 3 and 4 does not disclose “forming the at least one environment shape corresponding to each expanded shape by removing all portions of the

expanded shape which are common to the second shape pattern”.

Therefore, claims 6 and 21 are not unpatentable over Fridge in view of Chung and further in view of Simard, and are in condition for allowance. Since claims 7-10 depend from claim 6, Applicants contend that claims 6-10 are likewise in condition for allowance. Since claims 22-25 depend from claim 21, Applicants contend that claims 22-25 are likewise in condition for allowance.

35 U.S.C. § 103(a): Claims 13 and 28

The Examiner rejected claims 13 and 28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of Morrin (US Pat. No. 4,005,411).

Since claim 13 depends from claim 1, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 13 is likewise not unpatentable over Fridge in view of Chung and further in view of Morrin under 35 U.S.C. §103(a).

Since claim 28 depends from claim 16, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 28 is likewise not unpatentable over Fridge in view of Chung and further in view of Morrin under 35 U.S.C. §103(a).

35 U.S.C. § 103(a): Claims 15 and 30

The Examiner rejected claims 15 and 30 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fridge (US Pat. No. 4,648,053) in view of Chung (US Pat. No. 5,481,472) as applied to claim 1 further in view of DeCamp (US Pat. No. 6,063,132).

Since claim 15 depends from claim 1, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 15 is likewise not unpatentable over Fridge in view of Chung and further in view of DeCamp under 35 U.S.C. §103(a).

Since claim 30 depends from claim 16, which Applicants have argued *supra* to not be unpatentable over Fridge in view of Chung under 35 U.S.C. §103(a), Applicants maintain that claim 30 is likewise not unpatentable over Fridge in view of Chung and further in view of DeCamp under 35 U.S.C. §103(a).

In addition with respect to claims 14 and 29, Fridge in view of Chung does not disclose the feature: “wherein the prior to the step of forming a first shape pattern the method further comprises providing a base geometry having at least one initial geometric shape, wherein the step of forming a first shape pattern comprises adding at least one anchor to the at least one initial geometric shape such that the first shape pattern so formed includes the at least one initial geometric shape and the at least one anchor so added, wherein a first anchor of the at least one anchor of the first shape pattern comprises an extension and a flare, wherein the extension extends a first portion of the at least one initial geometric shape in a first direction along which the at least one initial geometric shape is oriented, and wherein each flare extends the first

portion in a second direction that is perpendicular to the first direction”. Fridge in view of Chung and further in view of DeCamp does not even mention extensions and flares as claimed by Applicants.

Therefore, claims 14 and 29 are not unpatentable over Fridge in view of Chung and further in view of DeCamp .

New Claim 32

New claim 32 includes all of the limitations of claims 1, 5, 6, and 15 and additional features. Therefore, Applicants maintain that claim 32 is not unpatentable over the cited prior art for at least the reasons presented *supra* in relation to claims 1, 5, 6, and 15.

Many of the new features recited in claim 32 relate to details depicted in FIGS. 1-3, 4A, 4B, and 5. For the convenience of the Examiner, claim 32 is listed below with pertinent reference numerals appearing in FIGS. 1-3, 4A, 4B, and 5.

32. (New) A method for reducing a number of shapes, said method comprising the steps of:

providing a base geometry (10) in a two-dimensional rectangular coordinate system, said base geometry having at least one initial geometric shape;

adding at least one anchor to the at least one initial geometric shape to form a first shape pattern (11), wherein the formed first shape pattern (11) includes the at least one initial geometric shape and the at least one anchor so added, wherein a first anchor (40) of the at least one anchor of the first shape pattern (11) comprises a first extension (41), a first flare (42), and a second flare (43), wherein the first extension (41) extends a first portion (22) of the at least one initial geometric shape in a first direction, wherein the first flare (42) and the second flare (43) are disposed on opposite sides of the first portion (22), wherein the first flare (42) extends the first portion (22) in a second direction that is perpendicular to the first direction, wherein the second flare (43) extends the first portion (22) in a third direction that is opposite the second direction and perpendicular to the first direction, wherein a second anchor (44) of the at least one anchor of the first shape pattern (11) consists of a second extension (45) and a third flare (46), wherein the

second extension (45) extends a second portion (26) of the at least one initial geometric shape in the first direction, and wherein the third flare (46) extends the second portion (26) in the third direction, wherein a third anchor (50) of the at least one anchor of the first shape pattern (11) consists of a fourth flare (51) disposed on a third portion (32) of the at least one initial geometric shape;

forming a second shape pattern (12) , wherein the second shape pattern (12) consists of all of the first shape pattern (11) and error shapes, wherein said forming the second shape pattern (12) comprises forming a first error shape (47) by moving the second portion (26) in the second direction, wherein said forming the second shape pattern (12) further comprises simultaneously forming a second error shape (52) and a third error shape (53) of the error shapes by shifting the third portion (32) together with the fourth flare (51) in a fourth direction that is opposite the first direction, wherein the second error shape (52) and the third error shape (53) have a same thickness (S) in the fourth direction, wherein the second error shape (52) is an additive error shape that physically exists in the second shape pattern (12) , and wherein the third error shape (53) is a subtractive error shape that logically exists in the second shape pattern (12);

extracting the error shapes from the second shape pattern;

deriving from a subset of the extracted error shapes at least one environment shape corresponding to each error shape in the subset of the error shapes, said environment shape reflecting a local geometric environment of its corresponding error shape;

deleting a subset of the environment shapes such that only a plurality of unique environment shapes satisfying a selection criterion remain subject to the remaining unique environment shapes differing from each other with respect to a geometrical characteristic of their

respective geometric shapes, wherein each error shape in the subset has a polygonal shape;

wherein the deriving step comprises: expanding each error shape in the subset to form a corresponding expanded shape, and forming the at least one environment shape corresponding to each expanded shape by removing all portions of the expanded shape which are common to the second shape pattern (12);

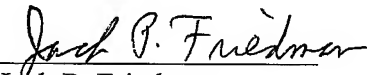
wherein expanding the first error shape (47) to form a corresponding first expanded shape (55) comprises outwardly projecting each bounding side (61-64) of the first error shape (47) by a distance (D_1 - D_4) in a direction perpendicular to the bounding side;

wherein said forming the at least one environment shape comprises forming a first environment shape (66) and a second environment shape (67) corresponding to the first expanded shape (55) by removing all portions of the first expanded shape (55) which are common to the second shape pattern(12), wherein the formed first environmental shape (66) is a polygon of 12 sides and is in direct mechanical contact with the second extension(45) and the third flare (46), wherein the formed second environmental shape (67) is a rectangle and is in direct mechanical contact with the third flare (46), and wherein the third flare (46) is disposed between the first and second environmental shapes (66 and 67) and separates the first and second environmental shapes (66 and 67) from each other.

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invites the Examiner to contact Applicants' representative at the telephone number listed below. The Director is hereby authorized to charge and/or credit Deposit Account 09-0456.

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